THE
VETERINARY RECORD.

The Official Journal of the National Veterinary Medical Association of Great Britain and Ireland, Limited.

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888.

No. 1734. VOL. 33]. OCTOBER 1, 1921. [NEW SERIES, No. 40, VOL. I.

Clinical Observations on some of the Nervous Diseases of the Dog.

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Presented at the N.V.M.A. Annual Meeting at Chester.

Mr. President and Gentlemen,—Let me first thank you and your Provisional Committee for inviting me to contribute a paper at this meeting. It is an honour of which I am proud, and I hope that what I have to say may serve to stimulate a good discussion. Your committee suggested to me as a subject the nervous diseases of the dog, but I found that subject far too large to be dealt with in a short paper, and I thought that if treated in the ordinary way, there would be so varied a discussion that not much benefit would result from it. I have therefore endeavoured to describe the more common nervous complaints as they appear to us when we encounter them in practice, to deal with them as clinical cases, describe the most noticeable symptoms, and to discuss these symptoms with the object of arriving at a diagnosis of the true pathological condition and to make a few observations which I hope may prove suggestive. I cannot and do not attempt to mention *all* the cases one is likely to meet, but I hope that I shall give you sufficient material for a really useful discussion.

Many of the commonest ailments in the dog are of nervous origin, and are not of sufficient importance to warrant the terms disease or illness being applied to them. They are neuroses, and if neglected may give rise to sequelæ which in turn may develop into definite illnesses. Perhaps the most frequently seen of these conditions is the bi-annual shedding of the coat, which of course is a normal procedure. At these times the skin is irritable; evidently a provision on the part of nature to induce the animal to rub and scratch in order to rid himself of superfluous hair and fur. Very frequently the condition for some reason becomes pathological, particularly among pet dogs that live an indoor life. The condition is aggravated by a sudden spell of unduly hot weather, especially when associated with dry east winds. At these times a dog will scratch and rub to such an extent that the owner is led to believe that there is some definite skin disease or parasite causing the trouble; and professional men have often been led to a similar conclusion, for I have had many such cases brought to me which had been professionally treated for eczema and mange, though no trace of such disease was present. Removal of the old coat is all that is required in the way of treatment, though if there has been much scratching and there is a dirty skin, a good bath and the administration of a saline laxative have a wonderful effect in bringing the skin back to its normal condition. This trouble with the non-shedding of the coat or undercoat is so common that it may be looked upon as one of the most frequent starting points of a large variety of skin diseases; and I think it is well worth while making a special note of it, as if it is recognised early, one may easily cure it, and save no end of trouble at a later date. If neglected or unrecognised, it may lead to some of the conditions I now mention. An excitable and nervous dog may bite himself raw, particularly on the back, sides and loins, and set up a dermatitis closely resembling eczema or impetigo, both easily cured, and not really comparable with the same diseases in man. A similar dog may scratch until he is no longer able to stand, from leg weariness, or the reflex excitability is so great that he may have a fairly severe convulsion. He is then taken to a veterinary surgeon, who may overlook the real cause of the trouble and treat him for paralysis or merely give him bromide for the convulsion, and leave the real disease untreated. A dog at such times is specially liable to mange and ringworm, and, in fact, all the evils which follow on a dirty and irritable skin. It is the observation and recognition of these small trifles in a dog's condition that go towards making a man's good reputation, and for this reason I make no apology for dwelling at length on what may seem to some a quite trivial ailment.

The dog's skin is also affected by some kinds of food poisons. I have seen a dog covered with herpetic patches and blotches as a result of eating bad fish, and no doubt everyone at some time has seen cases of heat rash or nettle rash, which is only more or less evanescent, and dependent largely upon diet. Such cases are easily treated on general principles. Falling in a convulsion is also commonly seen in cases of dogs persistently scratching the ear in cases of canker, even when the disease is not far advanced. The convulsion is due to reflex irritation and not directly to the canker. When due to canker, the latter is in an advanced stage, and the middle ear or even the meninges involved. It is difficult to distinguish between some neuroses and acquired habits, for

example, constant shivering and trembling such as is seen in Manchesters and Whippets. Who can give a reasonable explanation of this phenomenon? Again, if a dog has once suffered from subluxation of the patella, he may in future refuse to use that leg unless forced to do so (which in my experience is the best cure), not because it hurts him to do so, but through fear and distrust. The habit is acquired in two or three weeks, and if not tackled early, may last throughout life with consequent atrophy and contraction of the muscles. Similarly a dog will acquire the habit of coughing. I well remember a terrier who developed a cough which no drugs had any effect upon. He used to cough much as another dog would bark, that is to say, whenever excited or roused to enthusiasm, such as at the prospect of a walk or the advent of a friend. I eventually discarded drugs and tried moral suasion by striking the table with a folded newspaper and scolding whenever he started to cough. The habit was broken in three or four days and never recurred.

Perhaps the most common condition among nervous disorders which the ordinary practitioner is called upon to treat is a state of convulsion or fits. It would take a much more learned man than I to describe to you any sure method by which such a differential diagnosis may be made as will enable one to say exactly at once what kind of fit one has to deal with, and of what nervous disorder it is the symptom. Probably to the majority it does not much matter what the cause is, nor does it matter if any other symptoms are present, the case is more or less urgent, and something has to be done promptly, and there is not much variety of treatment usually adopted. From a scientific point of view and from a clinical standpoint it would be very desirable to be always able to rapidly diagnose the cause of fits, and our methods of treatment would benefit by the knowledge. Quite a number of veterinary surgeons speak of fits as *epileptic*, but I think this is wrong. Very many fits are *epileptiform*, but to what extent dogs suffer from true epilepsy has not ever been satisfactorily stated. Personally I do not think it so very common, though among a large number of cases a considerable proportion may be judged to be epileptic, if only from the want of evidence of other cause. Many fits occurring in the course of distemper are almost typically Jacksonian in character. I believe some practitioners are even able to identify "grand mal" and "petit mal" to their own satisfaction, but I have not been able to reach that state of confidence in my powers of observation. It seems to me that if a dog has fits of an epileptiform type, occurring at irregular intervals, and which do not yield to treatment, and are not concurrent with other known morbid conditions, we may be led to give a guarded diagnosis of epilepsy, and at the same time give a guarded and perhaps not too hopeful prognosis. As to treatment, arsenic combined with bromides I think gives the best results, but must be continued over a lengthy period.

Everyone is well acquainted with the fits which occur in distemper cases, but I do not think they are sufficiently frequently recognised as being only one of the many manifestations of the disease, nor is it realised by a great number of us that they often are the *first* symptom to be noticed at the onset, and the *confirmatory* symptom *in relapses*, and that when they occur in relapses, they are the sequel to a broncho-pneumonia which has often escaped notice. Thus a puppy may start distemper with one or two fits, but not show the classical symptoms of distemper for some eight to fifteen days afterwards. Again, a dog that has apparently made a good recovery from the disease may suddenly start convulsions, even from the sixth week up to three months after. If death supervenes or an opportunity of a post-mortem occurs, broncho-pneumonia is always more or less demonstrable. When these fits come at the onset they are not so dangerous as when following a relapse, and our prognosis may be formed accordingly. Febrifuges form the best means of treatment, and aspirin or sp. eth. nit. and aconite are the drugs I find most useful. Bromides are useless, or nearly so, and sometimes merely aggravate. Our aim should be to cure the morbid pulmonary condition.

Convulsions are seen as a result of many other morbid conditions to which I will only briefly allude. For instance, they are seen as a result of skin irritation, as already mentioned, and also as a result of irritation of the digestive tract. Thus they are common in puppies and young dogs as a result of overdosing with purgatives and worm medicines, and also of eating foreign substances, as coal, coke, wood, bones, basketwork, shoes, carpet and such like, and also from the presence of masses of ascarides in the stomach and bowel. When one is satisfied that one's diagnosis is correct, and that one is not dealing with distemper, bromide may be given, or perhaps hyoscine hydrobromide. It will be time enough when the fits are controlled to get rid of the offending irritant. I am quite sure that in these cases it is the very greatest mistake (often a fatal mistake) to give a dose of oil, or purge, or a worm dose. I believe more puppies are annually killed by this means than any other. If you want to rid a puppy of worms, choose a time when he is apparently in the best of health and vigour, give him one good dose and have done with it.

Fits also happen as a result of over-excitement, or over-exertion, especially in a hot sun. A species of fit is often seen in bulldogs on hot days at shows. Aspirin, antifebrin, and caffein are useful drugs in these cases, and may be accompanied by heart stimulants if necessary, but in all cases of convulsions the prime necessity is darkness, rest and absolute quiet. It is a good plan to put the dog in a padded hamper and shut

him up in a dark cellar, and leave him alone for some hours, where he cannot hear chattering voices, or have his eyes irritated by bright light.

Again, as evidence of the result of reflex irritation, convulsions are seen in cases of metritis, and particularly in those troublesome cases of purulent endometritis. It is a curious fact that this affection is generally, in fact, nearly exclusively, seen in maiden bitches, and is more common in advancing years. There is generally some history of former trouble to be gained, and there is also the dog's distended appearance, also the irregularity or total absence of œstrum, and these help us to make the diagnosis. It is not necessary to treat these convulsions, but to attack the causal disease by operation of total extirpation of the diseased parts or by medicinal treatment combined with local irrigation and stimulation. This latter treatment is by no means always a failure, and I disagree with those who say that there is no alternative to hysterectomy.

Convulsions also occasionally are seen in cases of eclampsia of the suckling bitch. As a rule they are not violent, and may be restricted to convulsive movements, or a sudden stiffening of the limbs, a temporary loss of consciousness, or merely an increased excitability. I do not know the true cause of eclampsia, but it appears to me to be similar in some respects to milk fever in cattle. The removal of the puppies and the administration of chloral (with caution) and saline aperients soon restores the bitch to a normal condition. It is not necessarily seen in bitches with large litters or in those with a large supply of milk, and I have seen it as frequently in the cat as in the bitch.

Screaming fits in puppies are sometimes called hysterical whether the puppy be male or female. I doubt whether true hysteria is ever seen in the lower animals, unless one of the conditions I have already named be termed hysteria. Sometimes dogs in advancing years who are affected by kidney disease—nephritis in some form or other—have convulsions, but not often is this symptom seen. When present the symptom is unfavourable, and often precedes coma and death. Other symptoms are always present which enable a diagnosis to be made, such as polyuria, suppression, heart disease, dropsy, asthma, a warty and hairless condition of the back, and cataract, or at least filminess of the lens of the eye. Lastly, fits are seen at the onset or during the course of severe brain or spinal disease, of which I shall have to speak later on, and during the course of specific diseases. To summarise my remarks, convulsions are merely symptoms, the expression of disorganised nervous energy, and to treat them rationally one must look for the underlying causes, though at times it is urgently necessary that the animal must be treated for the convulsion by means of some sedative. It would be folly with certain animals and certain kinds of owners to do nothing or appear not to do anything, but at the same time it is folly to dose every case that comes to one's hands with bromides or chloral. For instance, chloral given to a diabetic dog, especially with V.D.H., is very liable to cause sudden death. With so many cases it is imperative to stop the noise of a young dog in a barking or screaming fit. Total darkness and absolute quiet are the best remedies, and one must guard carefully against increasing the trouble by having a tussle with the patient while forcing liquids down the throat, thus not only increasing the excitement, but running grave risk of choking and subsequent pneumonia. Moreover one runs considerable risk of a bite, which we should take a pride in being able to avoid. A hypodermic injection can generally be managed without much trouble. My advice is generally to shut the patient up in the dark until the convulsive period is passed, then to administer aspirin, antifebrin, or such like drugs in feverish cases, and when the patient is calm and quiet to make a thorough examination to find out the cause, which can then be treated rationally.

I now wish to draw your attention to another condition which is becoming more common each year, and which I think must have been seen by everyone present more or less frequently. A dog is brought with the history that he is dull, with more or less arched back, depressed head and very stiff gait, and screams out if touched. Sometimes he will cry on first attempting to move, and will snap at and strongly resent anyone trying to handle him. Or the symptoms may not be so severe—he may only cry out when handled and otherwise seem all right. On the other hand, he may be almost unable to move, and be unwilling even to try and pick up food from the floor, and will obstinately refuse to urinate or defæcate. An examination with the hand will demonstrate that he resents light touch, but not firm handling, and that actual progression is not so painful as sudden, unexpected movement. One or more sets of muscles are in a state of more or less tonic spasm, and a muscular tremor can be detected. The temperature is raised one, two or three degrees, or even more. There is a look of fear and apprehension in the face. These symptoms vary with the character of the patient. In a lethargic dog they are not so marked, but in a nervous, highly strung dog they are accentuated. This class of case is becoming increasingly common, and it is of interest to debate what is the true significance of these symptoms. One man will say with confidence, "You have an undoubted case of acute rheumatism." Another will say, "You have a case of acute spinal meningitis." Another will say, "A case of chronic pachymeningitis," and I have seen and heard it described as acute pleurisy and acute peritonitis, constipation and other things. Now, among all these opinions where does the truth lie?

I confess that I find this a most difficult problem to solve, and as time goes on and I see more cases

I can say that I am very reluctant to give a diagnosis until I have had the case under observation for some time. At one time I did not think a dog suffered much from muscular rheumatism, but I have altered my opinion. I also thought that I could at once recognise acute meningitis and pachymeningitis, but I am now not so sure. I think it is exceeding difficult to say what a dog with the above symptoms is suffering from, and I do not give an opinion unless I am pressed to do so, and then I think I am very guarded in what I say. It is unpleasant if one has diagnosed pachymeningitis and forecast paralysis, and made a doleful story to find the patient rapidly improve and make a perfect recovery within a week! It is equally unfortunate to diagnose muscular rheumatism and forecast a cure, when having relieved the owner's mind, one is informed that paralysis has supervened, and to then find that this will not yield to treatment!

I think one is justified in making a diagnosis of rheumatism under the following conditions:— The patient has generally been exposed to chill or over-exertion. It generally occurs during periods of east wind or very damp, thundery weather following on a spell of cold. It occurs when the animal first moves after sleep, and is most often seen affecting one set of muscles, such as the abdominal, or longissimus dorsi, or levator humeri, and latissimus dorsi. There is apparently only pain on movement, particularly sudden movement. The muscles are tense and tender if squeezed or pressed with the fingers, and the whole appearance of the patient resembles that of a man with acute lumbago. The symptoms rapidly disappear under treatment with aspirin, or other salicylates, or even simple febrifuges, together with rest and warmth. Some dogs like to have the affected muscles rubbed and massaged, and if this is so, some stimulating liniment containing wintergreen well rubbed in assists in making a rapid cure, and it pleases the owner. Over-exertion and overfeeding should be avoided. It should be remembered that dogs vary greatly in their susceptibility to pain, and the amount of pain cannot be estimated by the amount of crying out that the dog will utter. A very nervous dog like a nervous man with gout or lumbago will yell even if approached. Families and strains of a breed are more commonly affected than breeds themselves.

Almost exactly similar symptoms are seen in sub-acute meningitis, and it is only by observation over a period of time that rheumatism and meningitis can be differentiated. In sub-acute spinal meningitis the attack is certainly induced by chill or by the liverish condition which is so often seen during thundery weather. It also follows on over-exertion, and particularly over-excitement. Similar sets of muscles are affected, but the symptoms are not so readily relieved by salicylates. The condition is much more obstinate, and varies from day to day. It seldom remains confined to one part, but progresses either up the trunk or down; thus the onset may be noticed in the neck, and as this gets better the back and loins may be in turn affected, or the reverse. It is better to start in the neck and travel downwards, for if the reverse happens, the inflammatory condition may spread to the brain. When the back of the head and neck is affected, and particularly if the upper part of the chord is involved, a prominent symptom is the holding back of the head. On the other hand, when the lumbar muscles or lower part of the back is affected, there is more or less loss of the power of progression, particularly the power to go upstairs or to jump. When the abdominal muscles are affected, the legs are drawn under the body, and the patient will not move. In the latter case the abductor and extensor muscles of the hind legs are generally the next to be affected, and when the acute symptoms are over, there remains a partial paralysis, which in a first attack generally soon submits to treatment.

Sub-acute meningitis is seen in all breeds. I have seen most cases in terriers, toy spaniels and small hounds, but probably this is because these dogs form the vast majority of my patients. When the disease assumes the form of chronic ossifying pachymeningitis as described by Gray, it is undoubtedly most frequently seen in dachshunds, and the result of two or three attacks is invariably permanent paralysis of the hind quarters. But though a dog may have many attacks of sub-acute spinal meningitis the result is not invariably paralysis. There is, however, an impairment of perfect gait, and evidence of previous attacks may be seen quite clearly in the toe nails. This is worth carefully looking for. The front of the nails will be found to be worn to a greater or less extent owing to the patient not lifting the foot high enough off the ground in the act of progression. There is dragging of the toe. Also the hair and feather of long-haired dogs will be found to have the appearance of having been cut straight across the toe. Such dogs are quite unfit for long walks or even short walks on the hard roads (but they go all right on grass), for the nail may get worn to such an extent as to bleed and become highly inflamed. Such cases should wear boots, and many of my patients do so. Lately I have devised more sightly and lighter arrangements for protecting the nails. One useful gadget is to pull over each nail a short piece of black indiarubber tubing of suitable diameter. This affords good protection. Another contrivance I have used is a small metal clip to pinch round the nail, and this is very effective. But good protection may be given temporarily by a bit of lead plaster or "heel ball," and if the dog remains indoors for a week or two, the nails will soon grow, and then only care is needed to prevent the same trouble recurring.

As to the cause of meningitis I should like to hear the opinions of those who have given the subject their careful attention. After a considerable experience I suggest for your considera-

tion the study of the relation of meningitis and tuberculosis. For many years now I have thought that many patients suffering from meningitis were also the subjects of tuberculosis, but in ordinary practice one is comparatively seldom able to confirm one's suspicions. In the few cases I have been able to properly investigate I have been astonished how often tuberculosis was present. I think there is no doubt that in dogs both diseases are greatly on the increase. Tuberculosis is far more common than seems to be generally accepted, and it is principally among these dogs that one sees rheumatic or meningitical symptoms. I do not think this is coincidence, but really cause and effect. At least I am sure it is so in quite a large number of cases. I submit this point for discussion, and I hope that it will be investigated by some one equipped with laboratory facilities, as a private practitioner can do so little towards getting exact data in such cases.

Tubercular dogs soon assume a peculiar type of face expression which is almost characteristic, only the faces of those with malignant disease in any way resembling them. When once recognised it is never forgotten, and perhaps may influence me and those who think with me more than it should do in forming an opinion. I remember well a case some years ago of a dog which I had known well all the nine years of her life. She was frequently with me, and had always been an exceptionally healthy, vigorous little terrier. When about eight years old she began to get apparently rheumatic, had a difficulty in going up and down stairs, cried if moved suddenly, and was tender in the neck and shoulders. She varied with the weather and sometimes seemed quite well. The attacks became more frequent, and although she was sleek and fat, she began to acquire the tubercular face. I was not very satisfied with her, and could find no physical sign of disease. I asked Mr. Alfred Sewell to see her in consultation, and his diagnosis was rheumatism, and he said he could find no trace of malignant disease, and he disagreed with me as to the possibility of tubercle. And of course I had no proof ; it was only conjecture. Yet when she was destroyed a few weeks later, she was found to have generalised tubercle. Her lungs were a mass of tubercles, some undergoing caseation. I could find no macroscopic lesions in the brain and chord. By the way, it is of interest in this case to know that this dog was never heard to cough or wheeze in spite of the state of her lungs. I have had many cases recorded like this, which is fairly typical of all, and I think it is very suggestive.

I will now tell you of another case having all the symptoms of rheumatism which I attended for some two years. This was a small Pekingese. Each attack of rheumatism (which affected the muscles of neck and shoulder loin) responded more or less rapidly to treatment. This dog was much affected by east winds and thundery weather. One attack early last year continued over a longer period than usual, and after continual cross-examination by the owner, I began to doubt my diagnosis and put this dog on a course of iodides. A partial recovery resulted, but the dog did not get rid of the tendency to cry out and regain the freedom of movement as previously except when under the influence of drugs. One morning this patient had a digestive disturbance and vomited a good-sized beach pebble. From that day onwards she has been perfectly well and never had a sign or symptom of rheumatic trouble. I have had one similar case in a fox terrier. It is the occurrence of cases such as these that shake one's confidence and make one wonder if one is really gaining any knowledge or wandering in a fog of only half-understood phenomena.

Before leaving the subject of meningitis I ought to draw your attention to the fact that meningitis is frequently seen as a result of acariasis and other inflammations of the ear when the structures of the middle and internal ear become involved. While this is very common in the cat and in other small animals, it is by no means infrequent in the dog. I think destruction is best in the dog in such cases, though I have had recovery even in cases which were followed by paralysis. In looking for a cause of meningitis one should therefore not neglect to examine the ears and enquire if there is a previous history of canker.

Of true paralysis there is little for me to say except that, apart from accidents and injuries and new growths, it follows upon meningitis in one or other of its forms. It is by no means a hopeless condition to treat, and it is worth while persisting with a case for three months, but I think one is hardly justified in carrying on over a longer period. Iodides followed or accompanied by strychnine is by far the most reliable method of treatment. The practice of blistering the skin along the spine is to my mind a barbarous procedure, and must cause torture to a restless animal like the dog. I do not deny that some good to the paralysis may result, but I would not allow any animal of mine to be treated in this way, and would certainly destroy it in preference. The electric current I believe to be useless except as eyewash for the owner. Even if intelligently applied its beneficial use is very doubtful, but it is a pleasant thing to be able, when improvement in condition occurs, to ascribe it to one's treatment (however futile) and not to mother nature. I learned a good lesson from a patient many years ago. A Pekingese, four months old, had distemper, followed by fits, amaurosis and paralysis. Mr. Sewell also saw this case, and we were both pessimistic over it. I treated it for some four months with no good result. It was encouraged to move about slung in a wash-leather sling, and had everything done for it that money could provide. The owner had many other good puppies and dogs, and I strongly advised that a merciful end should be put to the

poor decrepit animal. But the owner had religious or other scruples as to taking life (even of game and fish), and the puppy was kept. In six months the sight returned and the paralysis quickly disappeared, the dog getting stronger every day until a perfect recovery was made. He eventually took a championship and was the sire of several winners. This case and many other similar has led me to take a less pessimistic view of paralysis following on distemper, and I should persist in treating these cases in young dogs for a much longer period than I would paralysis occurring in older and mature dogs after meningitis. Following a second or third attack of pachymeningitis paralysis is practically hopeless, and it is far better not to keep the patient. Even if recovery were possible, the extreme probability of a further attack justifies us in strongly advising destruction.

Perhaps I should not leave the subject of paralysis without adding that treatment need not necessarily be restricted to the use of drugs. That would be conveying quite a wrong impression. The condition remains for some considerable time, and one has ample opportunity of exercising one's ingenuity in devising new methods of treatment and giving the owner plenty to do. But one should be careful not to set the present-day owner *too* much to do or to take up too much of her time, lest she tires of the case and one loses the chance of effecting a cure. It is merely necessary to keep her interest gently stimulated and not overtax her patience. The affected muscles may be beneficially rubbed and passive movements of the limbs carried out every day to prevent atrophy and contraction. The dog may be slung and allowed to just feel the weight of his body on the legs and the latter put in position under him. It is a good plan to tickle the hairs between the toes to induce him to make an effort to kick, and so voluntarily extend the legs. The power to extend the legs and then gradually take some of the weight of the body is generally the first sign of recovery. The owner should be warned against overfeeding. Get the dog as thin as is compatible with strength, as the less weight he is called upon to support the sooner the dog will be able to manage to stand on his legs.

The other frequent sequel of nervous disease is chorea. I purposely say "sequel," as I do not believe that chorea exists as a disease *per se*. It is not the same as chorea in humans, and I do not believe that it is ever seen in the dog except as a sequel to distemper infection. The fact that a dog has chorea is proof and sufficient proof that he has been infected with distemper. It generally (but not always) follows those cases in which convulsions have been a prominent symptom. In the early stages, that is, when it is first noticed, there is always a considerable rise in temperature, and it is then that there is most hope of effecting a cure. Distemper remedies, and especially febrifuges, also hyoscine, are the most useful, but many cases get well without any treatment at all. If a dog of mine had chorea, I should unhesitatingly destroy it; but of course it would not do to say this to a client. My experience is that if a dog has chorea for two years he will have it for the rest of his life, no matter what is done for him. I have known of cases, however, of dogs which have chronic chorea (but otherwise healthy), having been cured quite suddenly by sudden fright or shock. One such case was a choreic West Highland—very gun shy—being terribly frightened by having a gun shot just over her. She rushed away for a couple of hundred yards chased by a lot of spaniels and terriers in a panic. When caught and soothed it was at once noticed that the chorea had ceased entirely. I have heard of similar cases, but I have never tried the remedy personally.

I think the most hopeful cases are those in which the twitching ceases during sleep and where it is confined to one place, and the nearer this place is to an extremity the better. Thus twitching in the toe is much more hopeful than twitching in the neck, shoulder or jaw.

To the ordinary practitioner a post-mortem on a choreic dog reveals very little that is illuminating. I have never been able to see with the naked eye any changes in the brain or chord that would account for the disease. I should very much like to know if any members have ever seen chorea in the cat, and if so under what conditions ?

The last sequel of nervous disorders I shall mention is coma. This is only too frequently the precursor of death, but not always so. I think we are all agreed that it is a sign that the higher centres are involved in some morbid process. I had a case some ten years ago of a dog in a state of semi-coma for three weeks make a complete recovery, though I was never able to thoroughly satisfy myself as to the cause. The dog is alive now, and apparently healthy and strong, though he was ill quite ten years ago. Probably the commonest causes are distemper and nephritis. Rest, quiet and darkness, and careful feeding are called for in treatment, but of course all depends on one's diagnosis as to the cause. A word of warning I must give as to handling such dogs. I was trying to get a semi-comatose dog to swallow once. As an experiment I gave a few drops of water first to see if deglutition were possible. No effort was made, and I opened the mouth and moved the tongue. The jaws slowly closed on my thumb, which I found I could not remove before it was firmly held. The jaws continued to slowly close until the teeth went through the nail, and I had a horrid place to remind me to be more wary in future. The jaws had to be forced apart before I was once more free.

There is little or nothing for me to say about encephalitis or any disease of the higher centres. We all get cases at some time or other, either as a result of disease, tumour, or injury. The one constant sign is impairment of intelligence and the alteration in character. Treatment is on general

principles, with plenty of "wait and see." I think such cases are better destroyed, as a dog can never be the same again when once it has undergone any severe disease or accident affecting the limited amount of intelligence it originally possessed. I do not like to say too much on this subject, as I can only expose my very great ignorance on all things connected with the brains of both cat and dog.

This concludes my paper, but I would like to add that I can give you no bibliography. I have tried, when compiling these notes, to put all thought of books and other authorities on one side, and to tell you only of these conditions as they appear and have appeared to me in daily practice. The paper is entirely the result of my own personal experience, and I have consulted nobody on the subject. I therefore expect that many will be in disagreement with me, but that will make the discussion all the more interesting. There is much in the paper I have left unsaid. It is already too long. But I shall have the greater pleasure, if you will give me the opportunity, of answering any questions or amplifying my remarks in my reply, when I can go into such details as may be interesting more fully.

I have to thank you for so patiently listening to what I have written.

Discussion.

Mr. E. H. Stent, Manchester, opened a discussion upon the paper. He said: I must first thank Mr. Livesey for giving us this interesting paper on "Nervous Diseases of the Dog." This Association has previously had some excellent papers on canine matters by him, and I am sure canine practitioners are very grateful. I think he is right in presenting this paper from a clinical aspect, as nervous diseases generally are little understood, and their pathology mostly theoretical. To the average practitioner a post-mortem examination reveals but little, and beyond some degeneration of nerve cells a microscopical examination carries one no further. In perusing this paper one notices the careful and practical manner of presenting the various cases mentioned, and in the main I see little to disagree with, but wish he had touched upon the question of heredity, and the part played by close in-breeding and the breeding from weaklings to get small size, as in some toy breeds, as a factor in causing the nervous conditions so frequently found, and particularly in reference to epilepsy. In my opinion, heredity plays a considerable part, having known families whose progeny nearly all developed nervous conditions, one in particular for three consecutive litters to the same dog developing epileptic conditions at some period before a year old. They were kept under ideal conditions and had every attention, and were free from distemper infection; they were closely in-bred. Epilepsy I look upon as a result of this in-breeding, which only awaits an exciting cause for development. In cases of neuroses from irritation at the time of changing coat, the animal has generally been dressed with some remedy before we are consulted, which makes diagnosis none the easier. I quite agree that a great number of dogs are lost through over-dosing for worms. One has only to look in the advice columns of the dog press to find the reason for much of it. The dog fancier likes to get a quick result, and often gets it, but not as expected. In the differential diagnosis of convulsions, the age of the dog must be our guide to a great extent, viz., from weaning to four months, worms; from four to six months, teething or worms; from six to twelve months, probably distemper; over twelve months, possibly distemper or reflex from various causes; in bitches, after whelping or weaning, or later in life, endo-metritis. Mr. Livesey considers that when convulsions appear at the outset of distemper they are not so dangerous. In my experience they are equally dangerous, as indicating an early bacterial invasion of the nerve centres. Although they progress for a time, progressive paralysis frequently supervenes; whilst those coming on when the dog is on the road to recovery are mostly reflex from lung or bowel; ulcers in the latter I have often found to be the only cause. His summary that convulsions are merely symptoms, and to treat the dog rationally one must seek the underlying cause, is to be noted; but in the meantime it is necessary to be acting to relieve the dog from the distressing symptoms as quickly as possible. Dosing by the mouth is dangerous. I find it best to cover the dog over with a rug or blanket, and give chloral per rectum; when that has taken effect, apply cold packs to the head and neck. I believe chorea to be only a sequel to distemper, and have never seen it in a cat. The conditions mentioned of screaming if touched lightly, painful spasms, etc., on which a variety of opinions are mentioned, may arise from several causes, and to give it a name I would take that of so-called rheumatism, which I take to be an auto-intoxication, producing inflammation in the connective tissue and muscles, and sensitive to atmospheric changes. The foci of infection may be from teeth or gums, in the bowel, or caused by lice infecting the dog with a form of trench fever. A veterinary surgeon in Devon wrote me of a spaniel having symptoms as described by Mr. Livesey, which aspirin relieved for a time, but the attacks returned again and again, but less severe. It was found to have lice, and after destroying these the attacks ceased. If Mr. Livesey knows anything about trench fever in man, I shall be interested to know whether he thinks there is a similarity to his cases. Chronic ossifying pachymeningitis I find in all small breeds; rarely in a dog as large as a collie. Although I make many post-mortems, I do not very often find tubercle in dogs, and then generally mesenteric. I believe it to be contagious from man, having several times found it in dogs whose masters were suffering from tuberculosis; in some

cases known to have licked up his expectorations. As advised by Mr. Livesey, always examine the ears when any symptoms of meningitis are present, particularly in cats. I have frequently found dried dust and wax as hard and as large as a pea, causing pressure on the brain. Cases of paralysis require more patience than most clients will give, and to suggest three months' treatment generally puts on the black cap. When that time is given, I have had cases made good recovery, but their action is never so free as before. The case he mentions of the Pekingese puppy had a reasonable chance of recovery on account of youth, the process of growth and development being most active. I do not like blisters in these cases; they are generally worse afterwards. Mr. Livesey's advice on treatment and general management is sound, and his "wait and see" policy advisable before giving a fixed opinion. Nervous diseases in dogs, except in specific diseases, as rabies and neuroses, practically amount to convulsions from various causes, followed by conditions according to the part affected, and in the treatment chloral, bromides, and arsenic are useful in playing a part, together with petroleum oil and salol; but believing most are reflex from some bacterial-infected centre, I have had many good results with vaccine injections of the staphylococcus and streptococcus bacterins; when distemper is suspected, the mixed distemper bacterin. I shall be glad to hear Mr. Livesey's experience with these. I must apologise for this short opening and the scrappy nature of the remarks, having had the paper only a few days, and little time to digest it.

Mr. H. Gray, London: I cannot agree with Mr. Livesey on many points. For instance, he says epilepsy is a rare disease in a dog. It is a very common disease where it occurs periodically. It may go on for many years, and may be kept in check by bromide and iodide of potassium; but it is really incurable if it appears late in life. As to the condition recurring in young puppies three or four months old, when you take them out for a walk after they have been confined to a dull house for several days, let them loose, especially on a bright day, they have these screaming attacks and rush about; they correspond more to the hysteria in children, and may be treated in the same way as epilepsy, and they do not recur after the second dentition. As to the nervous diseases being principally confined to convulsions, I cannot agree, for my experience is that there have been nearly as many diseases in a dog as there are in a human being. Very often in distemper you will get convulsions, which may pass off into general paralysis, and a dog after a time becomes comatose, and dies in a state of coma. According to an experiment in research as carried out in an asylum by some asylum doctors and a French veterinary surgeon, those lesions, taking into consideration the anatomical differences of a dog's nervous system and a man's, correspond with those occurring in general paralysis of the insane following syphilis. There is another condition of a dog I have seen—a kind of epilepsy due to irritation of the skin or any part of the body. It also occurs in a cat. In my experience they are incurable. Then we come to pachy-meningitis; I think I was the first in this country to describe it by that name. I can look back over those cases for years, and the animal generally shows recurrences of so-called rheumatic attacks. They eventually end in paralysis, and on making a post-mortem examination one found that the root of the nerve emerged through the vertical ossified growths. No doubt they start as neuritis at the root of the nerve, and when they attack the sensory root they cause excruciating agony. One can understand, when these nerves supply the abdominal walls, that when the skin is touched gently they cause excruciating agony, as one would get in meningitis in man. The nerve symptoms and the lesions are well defined. It does not follow that when a dog has paralysis it will not recover from it; but, as a rule, the dog has a recurrence from paralysis. I know a case where a dog, after food, used to scream terribly. After five or six weeks' treatment the dog recovered. In the autumn he had an attack from which he recovered; then he had another attack the next spring. The owner said I could have him for a post-mortem. When I examined the brachio plexus, I found pearly growths like mother-o'-pearl, only very dense, more like marble. Then there are many cases of vertigo I have seen. Sometimes you will see nothing to account for them; sometimes you will see lesions in the brain. I have seen that kind of vertigo appear after suppressed heat. When the suppressed heat has been treated, it has disappeared. I have had a good deal of experience of tuberculosis. I have not only confirmed it during life and at post-mortem examinations, but I have submitted the lesions to Sir John M'Fadyean, who has verified my diagnosis by bacteriological examination. There are many instances in which the dog shows very few symptoms of tuberculosis. In one case I had a dog that showed an occasional cough. The lower portion of the chest seemed to fall in. I injected him with tuberculin, and he reacted. On making a post-mortem examination I found the glands a tremendous size and cystic. In that particular case Sir John M'Fadyean could find very few tubercular bacilli. Mr. Liversedge once brought me a case of tuberculosis—a dog with a pain. The dog had a typical expression of tuberculosis. Mr. Liversedge made a post-mortem examination a fortnight after, and verified it. That dog belonged to the wife of a physician who was suffering from tuberculosis, and her husband also was suffering from tuberculosis. My idea is that the dog got tuberculosis by licking the spittle in the spittoon. It is a much more common disease in the dog than people are aware of, and it is a very common disease in a cat. I have seen one lung absolutely atrophied, and in many conditions in tuberculosis one gets chronic ulcers about the neck which will not heal. Another condition I have also seen in dogs not usually recognised as tuberculosis is seen especially in big

dogs—that is tuberculosis of the bones. Tuberculosis is sometimes very common in parrots. It may be said that they are subject to three forms of tuberculosis—the avian, the bovine, and the human. One can understand them suffering from the human form of tuberculosis when people chew food and make the parrot eat it out of their mouths; they will also frequently give it milk. I think Mr. Livesey has given us a very instructive paper, with plenty of food for discussion.

Mr. T. C. FLETCHER: The principal nervous disease that I have had the largest number of clients in is that of fits. Mr. Livesey, in his paper, deals to a certain extent with fits, but to my mind he does not go deep enough into the question, both of the cause of fits and the method of treatment. I should like him, if he would in his reply, to give us a more definite treatment as to how he can allay fits in dogs bred by clients—dogs which have had two fits in a day or more. He puts it down to all sorts of causes, even to an irritant skin. My way of treating is to try and find out the cause, but I must say I have been unable in many instances, and in minute examinations, to find out the true cause of fits. Perhaps we all find out the cause, but, as a rule, I have said, "Never mind the cause; let us try and stop the fits." We have all of us, I believe, fallen back on bromide. It is suggested that an arsenical treatment be adopted, and arsenic of bromide and arsenic in its different forms; but the slowness of this treatment does not appeal to your clients, and it is not, to my mind, satisfactory. Mr. Livesey, in his paper, says that chorea in dogs is only following on distemper. I must admit that chorea is a disease which usually follows on distemper, but I have had several cases of chorea that have not been recorded by the age of the dog, by the history of the symptoms of the case, and in which there have not been any signs of distemper affection. Within the last fortnight I have had one of the worst cases of chorea in the case of a little West Highland bitch. It was my earnest desire to put the poor animal out of its misery. One feature so impressed me as to make me stick to the form of treatment that I did. During the time that this animal was lying it went fast asleep, and the whole of the symptoms stopped. The animal was to a certain extent in a state of coma. She could have been awakened in a moment, but the whole of the chorea symptoms had stopped. I think those are cases in which we should endeavour to effect a cure before recommending destruction. Nine cases out of ten of chorea are cases which it is almost hopeless to cure, but where you get a case of chorea where an animal is perfectly quiet in its sleep, I think you ought to persevere in treatment. The treatment in this case was bromide and chloral hydrate. Then I had the courage to get an injection of morphia. I quite admit I was erring in giving an injection of morphia, but in this case I erred on the right side, because the animal went to sleep and stayed in that condition without any convulsions or chorea effects for some time. Mr. Livesey has not mentioned the case of tetanus. There are a good many practitioners, perhaps, who have never seen a case of tetanus in a dog. During the whole time I have been in dog practice I have only seen two cases. They are well marked and very interesting. You have seen an imitation of a dog made of pot. In a case of tetanus you have a dog that you can hold up by its chest or underneath the abdomen, and it is a perfectly rigid animal. I have never seen one get better of tetanus, because nine times out of ten they die from septic pneumonia, due to their inability to swallow. Mr. Livesey's paper must appeal to many. I would ask him if he would give us some remarks on the question of epilepsy or fits in dogs.

Mr. GRAY: May I refer to chorea? I never saw a case of chorea in a dog that I could not trace back to an anterior attack of distemper. When a case of chorea is brought to you, you want to follow the dog's history for some months back, and in those cases I think you will find they have had an attack of distemper.

Mr. J. MAYALL, Bolton: With regard to distemper, some time ago I had a vaccine sent to me by a French firm, and they finished by saying the vaccine had cured distemper. My view is that distemper, provided that you get it in the early stages, is not a difficult disease to cure, and that you do not need a vaccine to cure it. What trouble most are the nervous sequelæ. If you can ward off these nervous sequelæ, you will do good. The question is, how to treat a dog in order that those nervous sequelæ will not arise. I have had many cases of distemper to deal with. With regard to injuries to the spine, I had a dog run over by a military motor-car and brought into the surgery. He was walking on his fore legs, with his hind legs up in the air. The books say, I think, that the condition is due to spinal meningitis. In this case I do not think that had anything to do with it. I was reading Whitlaw's "Dictionary of Treatment," and I think, in the case of dogs especially, we can get very good tips from human medicine on their treatment. I came across a paragraph that mentioned the stretching of the spinal column as a cure for paralysis. It went home to me a little bit in connection with this case, and a few days after I picked up this dog three times a day by his hind legs, and suspended his body clean off the ground, and increased the time each day in which I did this. In course of time the dog was able to put his hind legs down. He walked about the yard. His spine was never quite straight, but still he could get about very well. The owner was going on a holiday to the Isle of Man, so I advised him to take the dog with him, and give it some sea bathing. They sent the dog in the sea every day, and it made a perfect recovery, and to-day it is as good as ever it was. I was glad to hear Mr. Gray speak about testing dogs for tuberculosis. I think the profession as a whole is greatly ignorant on that question. I do

not remember having read any good articles on the testing of dogs for tuberculosis. Personally, I have used the ophthalmic test. I do not know that I am justified in using it, but I have used the ophthalmic test. I certainly have been able to pronounce that a dog was not tuberculous, but I do not know whether I have been able to pronounce that a dog was. It is very interesting to know that a dog does answer to the tuberculin test.

Professor HOBDAY: I should like to add my testimony of thanks to Mr. Livesey. The paper is to some extent a generalised one. It confirms that we have made a good deal of advance in the treatment of these diseases of the dog in some instances, and yet in other instances that we are much in the same position that we were many years ago. It is a subject that it is really worth while to tackle, but it wants to be tackled in a much more systematic manner in the future than it has been in the past. It wants the combination of the pathologist with the clinician. There is no problem more than the nervous diseases, especially of the dog, which will give a greater field of research for the combination of the clinician and the pathologist, and it is a subject which has been very much neglected in the past. It is a subject that is well worth tackling on account of many analogies between the diseases of the dog and the diseases of the human subject. In treating or in considering the pathological symptoms of diseases of the dog, a man can get a very great deal of information from what is being done daily in human medical work; and at the same time those who will put on record their experience of the treatment of diseases in dogs will render a great service to their human confrères. They have practically identical difficulties to deal with in human patients at the present time with their nervous diseases that we have to deal with in our canine patients, and I think I am correct in saying that they are not a bit more advanced than we are. I know the human practitioner, in dealing with some of the diseases mentioned here, particularly epilepsy (which probably includes a number of things, and is not due to any one specific cause), would welcome as a God-send anything that could be put down as an absolute specific to relieve the distressing conditions that are shown by human patients suffering from this particular terrible disease, and we, too, who have canine patients brought to us, would often give a great deal to know what to do to put the patient quiet in such a way that we were satisfied that we had combined true pathology and true clinical treatment. At the present moment we fly merely to bromides or chloral or sedatives or something. We cannot do with that yelling or screaming. We have to settle it somehow, and we give it something for the moment that will pacify the animal. But we do not feel that we are doing the correct thing. We are temporising. Then as regards treatment by arsenic. There is no question that as far as we know at the present time arsenic is to us the most reliable drug, and one on which we can mostly rely, once the animal has got rid of his violent symptoms, to give a chance of these symptoms not recurring. The fits are not due to any particular cause. You have fits of the puppy. You have certain forms of fits which do not come again after the teeth are all cut. You have the fits of the old dog, and you have also fits in dogs of middle age. Generally the canine practitioner puts these down to different causes. The first thing he thinks of is: What is the cause of this? He puts these down to different causes, and makes his treatment accordingly. In the young dog probably the commonest cause of a seizure of this kind is teething fits and over-excitement. In the middle-aged dog there is a dietary which is not an uncommon cause. In the older dogs one always flies to examine the heart, to see whether that is at all in a disordered condition. The paper is to a very large extent generalised. The writer does not put any specifics down as being specifics for certain diseases. I wish he had done so. I was hoping that we should have had some things which he could have said had been specifics for these nervous diseases; but the guarded way in which he has mentioned certain drugs, without absolutely pinning his faith down to any one of them, shows us the present state of our knowledge on these particular things, and emphasises again the necessity for our keener observation on the subject, and for our combining as far as possible the knowledge of those who have become specialists in pathological questions with those who have become specialists in clinical work. It shows us again the importance of adopting the suggestion that we should select or appoint somebody connected with the Association as a pathologist, to whom we could send spinal cords or other things upon which we wanted a definite opinion, without obligation of any kind, and get the opinion of a specialist on a particular point we wanted to try to elucidate.

THE REPLY.

Mr. G. H. LIVESEY: I thank you for your kind reception of this paper, and Mr. Stent for letting me off with such merciful criticism. I had some difficulty in writing this paper because it is not a subject which lends itself to very exact treatment, and I thought that if I gave you my idea of clinical pictures of cases that arise it would suggest to you cases that came within your own knowledge, and so promote a healthy discussion. I hoped that more would have taken part in it, because I should have gained greatly by hearing the experiences of men in the different parts of the country. Mr. Stent spoke of dogs suffering during their recovery from distemper. I understood him to say he found fits occurring early in distemper were just as hard to cure as those occurring late, and were of just as great importance. I do not think so, because, to my mind, fits that occur in the early stages of distemper generally arise from the first infection, where you have possibly the initial rises of temperature. In my experience distemper, as a disease in itself, if taken early, is one of the easiest diseases to

control, if you take proper measures to control it. Convulsions that occur in the early stages of distemper respond to treatment just as quickly as any other symptom would respond. Not so the convulsions that arise later on in the course of distemper, because in that case the cause is generally a relapse or an infection from another source, and by the time the dog gets a second infection, or is liable to such, his system has been weakened, and he does not throw off illnesses so quickly. If he gets any other disease apart from distemper, such disease is more difficult to cure, and I think for that reason alone fits that occur late in a case are generally more troublesome than those that occur early. Mr. Stent mentioned the subject of lice and trench fever. I have no doubt in my own mind that lice do cause an immense amount of harm to a dog. I do not know anything of trench fever, but I do know that where a dog is infected with lice, and he gets any other disease on the top, he is already weakened. He is generally more or less anæmic, and he will die more readily. Also where a dog is badly infested with lice, particularly such dogs as spaniels, where you have a thick, shaggy growth, and the lice have grown to large numbers before they are very often recognised, the dog seems perhaps just a little off colour. You may have him in for treatment, and while he is in your hands he may be dead in a couple of days. The lice seem to cause a pernicious anæmia, and I have no doubt they cause toxæmia, which may rapidly produce death. And I must say that very often death is preceded again by convulsions. Mr. Stent has mentioned the subject of heredity. It is a subject I carefully avoided, because I do not know anything about it. All I can say is that, as with human beings, you get a hereditary predisposition towards certain ailments. A whole litter will suffer badly; others seem to be of a strong stock, and do not suffer in the same way. Also some dogs naturally, like human beings, are, shall we say, more neurasthenic and more liable to nervous troubles, and one sees it very well marked where you get in-breeding—not necessarily breeding from brother and sister, but very often by one bitch from one of her own sons. That is a very pernicious thing. Breeders are very fond of doing it. Breeders get a litter of five pups, including two healthy little things and one weedy little thing. That, of course, is their ewe lamb, and they say if they can save that one it is worth £500 to them, and they let the healthy dogs go; it is the fault of the show-ring. We ought to set our faces against it, and try to get breeders to produce good, strong, wholesome pups, and not those terrible little freaks that you see ladies carrying about under their muffs. Mr. Gray spoke about epilepsy and pachy-meningitis. I can bear out everything he says in relation to it, but I have not had opportunities of making detailed post-mortem examinations. I have never been in a position to make many post-mortems, because my clients have been rather of the sentimental variety, and did not like the little corpses being cut up after death; and in later years I have suffered from a disability in the fact that our dustmen are getting high wages and they won't take dead animals away. I make it a rule with clients that if they want me to destroy a dog they must take away the carcass afterwards. Therefore I have lost the opportunity of seeing as many post-mortems as I would have liked to. What Mr. Gray says about tuberculosis is perfectly correct. I am glad he bore out what I said, that tuberculosis is ever so much more common in a dog than we are given to believe. It is quite easy for us to make a definite diagnosis, because tuberculin is at hand. You can use the eye test, which is not always very satisfactory; but you can inject your tuberculin, and you get the rise of temperature, but you get the reaction much earlier than you do in a cow, and if you leave it till the twelfth or eighteenth hour you will very likely miss it. But if you have a great deal to do with dogs, and you recognise what Mr. Gray has properly described as the tuberculous expression, you will not want to fly to tuberculin. You will notice the lack of lustre in the dog's coat, his flat side ribs, his awkward progression, stiff gait, sometimes pendulous abdomen, and the pitiful look in the face, with the wasting of the temporal muscle. The temporal muscle is the first to go, because they lose the fat in the ocular cavity. I did not say much about the cat, but in passing I should like to draw your attention to the extreme frequency of tuberculosis in the cat. He is more liable to it than the dog, because the cat is a very much cleaner animal. If there are any tuberculous bacilli about in a dusty house where there is a tuberculous patient and a Persian cat, you are practically certain in a year or two to find tuberculosis somewhere in the cat. No cat gets the tuberculous bacilli in his coat. He washes himself and transfers it to his inside, and his bronchial or mesenteric glands get affected. One of the frequent seats you will find is the retina. It is a common thing to find tuberculous retinitis in a cat, and the breeds in which it is commonly seen are the chinchilla, the pale orange, and the silver tabby, to a less extent in the blue Persian; but in the chinchilla it is quite a common thing to see tuberculosis. Mr. Fletcher asked me to give him a cure for fits. I wish I could. As Prof. Hobday has said, the matter is so urgent that you try to use a makeshift. The first thing is to stop the noise and the convulsive movements, to ease and re-assure your client. You have to do that before you can make up your mind what the cause is. It is no use setting about to remove the cause until you have stopped the noise; but my experience of fits has been that a nervous sedative is called for at once, and you want something that will act quickly. I think you are safe in using aspirin. I think it is about the best drug we have, but don't use it in doses like the modern neurasthenic ladies use it. Two or two and a half grains is quite enough to start with, and it is quite easy to give the

dog, even when in convulsions. You can repeat the dose in half an hour. Given in small doses repeatedly, it is infinitely more efficacious than giving three or five grain tablets all at once, which you have to push down the throat at the risk of getting your hand bitten. I do not think there is such a thing as a specific for fits in a dog. I have suggested the use of hyoscine; I have given it in one-hundredth to two-hundredths of a grain hypodermically. Nobody has said anything about the danger of using chloral. Years ago, when I was less experienced, I am afraid, I killed one or two by giving chloral. You want to be very careful when you give chloral that you are not dealing with a case of valvular disease of the heart. It is not worth while running the risk of using a dangerous drug of that kind. Mr. Fletcher spoke about chorea, and he gave morphia to quieten his case. Morphia is a very curious drug. You may use it on some dogs. You may use it in quite a number of cases, and it will act most satisfactorily and please you, and you will make up your mind that you will use it in future. Then you will come across a case that will not go to sleep. Such cases are a nuisance. If you use it on a cat, you may have the cat trying to jump the wall instead of going to sleep. It acts as a delirient sometimes in a cat. Mr. Fletcher is quite right in saying that the thing to do is to induce sleep. There are many drugs one can use to induce sleep. I think he is quite right in dealing with chorea. Chorea in its early stages is undoubtedly a nerve irritation, and I am satisfied, as far as my experience goes, that chorea never occurs except as a sequel to distemper. Chorea being an irritable condition of the nerve in its early stages, the thing to do is to give the nerve rest; and it is an excellent symptom if, when you have got rest, you have got the chorea under subjection. If the chorea persists during sleep, it will probably during life; but if you can get rest and sleep, and get your chorea under subjection during the first month or six weeks, I think you can be pretty certain of a cure. Where chorea has run on for six months or more, it is going on for the rest of the dog's life. I have seen several cases of tetanus in a dog, but not quite like those described by Mr. Fletcher. In cases that I have seen, where there has been an injury to the dog, and it has been followed by tetanus, there has been no locking of the jaw; but if there has been rigidity about the muscles of the head and a peculiar drawing up of the ears, making the ears stand very erect, there again you have a peculiar facial expression which you cannot mistake. I have never seen a dog die of it. The condition has been transient, and I do not think the dog has been ever the worse for it. I have only used sedatives. I never used anti-tetanus serum for it. I never thought it called for such active measures. As to distemper and its sequels, I should like to say that these nerve symptoms most commonly follow on distemper, and one must go back a long way in the history of the dog before we can be satisfied that he has not had distemper. Very often you get a dog brought to you with fits, and you say, "Has the dog been in good health for some time, or has he had the distemper?" You will be told, "Oh! yes, I think he has had distemper, but he has never been ill as long as I have had him." Very well, you say, this is not a case of distemper fits; but you will find the owner only bought the dog a few months previously, and he probably bought it from a dealer or a breeder, and it had distemper infection upon it. It moved into different surroundings, and the new owner took it out and over-excited it, and the brain re-acted, and you got fits. I am asked what is the best way to prevent these things. I think the best way to prevent a dog having fits, if these fits come from distemper, is to see that the dog during the time it has been subject to distemper infection, never runs any risk of getting any lung infection. If you can be quite sure that a dog never had distempo-broncho-pneumonia, he will probably remain free from fits. I have no proof of that; I say that just from my experience. I say it because in practically every case where I have been able to make a post-mortem on a distempered dog that has shown nervous symptoms, by going through the lungs very carefully you will find little patches of broncho-pneumonia, which, unless you look for them, you might very well have overlooked. I think the nervous symptoms are nearly always secondary to lung infections; so that the best way to prevent them is to see that the dog does not get a lung infection or a lung complication. Very often the dog has distemper so very slightly that it is scarcely noticed. It is not considered of sufficient importance for the dog to be taken for treatment to a veterinary surgeon. He may have been only off colour for five or six days, and he is all right again, and they think nothing of it. It is when he is apparently well again that the owners take him out and overdo him, and he catches cold or he gets something which causes him to take cold in the lung. He has, perhaps, a very slight, husky cough. From two to three weeks after that he will have a slight convulsion, and you do not get all the history of the previous troubles, because they are very slight and have never been thought worthy of attention. But if you ask your clients carefully for a previous history, it will astonish you how often you will get a history of the slighter symptoms of distemper. What Prof. Hobday has to say is all for the benefit both of ourselves and of the medical profession. He has referred to the fact that the treatment of dogs is very like the treatment of human beings. I would go a step further than that, and say that the treatment of dogs and cats is very like the treatment of young children. The ailments of children are like the ailments of young dogs; and they are alike also in this respect—young children and babies cannot tell you their symptoms. The doctor who is to be a children's doctor has to gain his experience by observation. We who have to get our experience from dogs and cats gain it by observation. If we depended upon all the symptoms and information that were told by by our clients, we should never get

at the truth. In the same way the doctor who treats children does not believe all that the nurse and the parent tell him. He listens to them politely, but he makes his own observation. We should do similarly, and I think we can gain a great deal of information by studying the diseases of children. Prof. Hobday spoke of specifics. He says I have treated the paper in a general way. I have. He hoped I should be able to give the names of some specifics. I should have been only too glad to do it, but I do not know any. I do not think there is any specific. I doubt, as time goes on, if human doctors will not find that there are fewer true specifics for the ailments of human beings. I do not mean to say that old-standing remedies in human medicine are not worth the name of specifics, but we have not the same drugs suitable for the use of dogs. It is nice, of course, to have a prettily-coloured medicine in a bottle and say, "This is my specific," and be able to sell it at a good price; but it is not possible. I do not believe there are specifics, and I should like, in conclusion, to add that I hope this Association will be able to see its way to provide the profession with a pathologist as suggested, so that we may send our cases for post-mortem to him and get his guidance. It is almost impossible for a man in a busy practice to make a proper post-mortem examination. He can cut a dog open and look at the inside, but he does not see with the eyes of a true pathologist. A man who is a good clinician cannot be a good pathologist. He has not the time for it, because he has not the time for study; but the good clinician, acting in conjunction with the good pathologist, might do a very good deal for the welfare of the profession.

Life Duration of Performing Animals.

"It would be interesting," says *The Times*, "to have some exact statistics of the duration of life of performing animals. Take the case of the succession of chimpanzees advertised under the name of 'Consul.' They were all young animals. They all had much the same *repertoire*. They all had a real terror of the whip, and it is stated they all seemed to have had a similar misfortune with those powerful teeth which even a tame chimpanzee is rather too ready to exercise on his owner. How long did they live? No doubt some of the specific allegations of cruelty failed. No doubt it is to the interest of trainers to preserve the lives of valuable animals as long as they can. But when the curtain rings up the animals must be ready to go through their evolutions, and have to be kept in such a state of submission that they respond to the master's gesture. The gesture is usually made with a whip or other weapon. It requires little imagination or knowledge of animals to realise the memories which have invested the whip or wand with authority."

The Veterinary Record.

1st October, 1921.

CONTAGIOUS ABORTION IN CATTLE.

It was indeed a fortunate, if disappointing, chain of circumstances which ultimately led to the postponed discussion on Professor Edwards' paper on *Bovine Abortion and its Control* being sent to the Branches for consideration. Fortunate, because by this means practitioners in all parts of the British Isles, relatively few of whom were able for one reason or another to be present at the Annual Meeting at Chester, now have an opportunity of taking part in the discussion, and thereby furnishing valuable information concerning the clinical aspect of the disease. The paper is a concise and discerning digest of the more important literature which has appeared during recent years, and represents no mean endeavour on the part of the author, who, during its preparation, must have had ever prominent in his mind the hope that valuable information would be elicited from practitioners' contributions to the discussion. If this be so, the result of the first meeting, held in Dublin last week, must have been indeed gratifying to Professor Edwards.

The most important and least complete part of the paper is that devoted to a consideration of methods of controlling bovine abortion, and much useful information should be obtained from those who have had experience of the difficulties which are met with when endeavouring to check its ravages. Many have had experience of the almost hopeless task of control by *isolation* under the conditions which obtain on many farms. As Professor Edwards says, "It simply implies separation or segregation of diseased cattle liable to transmit the infection directly or indirectly by means of their discharges from the still healthy cattle in the herd." Unfortunately the hopelessness of adopting such a simple means is only too often apparent to many who are called upon to effect the control of the disease. Similarly, as is well known, the use of a living vaccine is limited, since it can only be applied for the protection of non-pregnant animals, and should not be employed in a herd which is not already infected with the disease on account of the risk of manufacturing "carriers."

The protective value of a vaccine consisting of dead organisms is generally considered to be less than that of a living vaccine, at any rate with the dosage usually employed, although it has the advantage of being unattended by the risk of infecting otherwise healthy animals.

General cleanliness, the disinfection of infected materials and the contaminated *external* parts and irrigation of the generative organs of abortive cows with *non-irritant* antiseptics should under no circumstances be omitted from any scheme adopted for controlling the spread of the disease.

Since, then, all methods of controlling epizootic bovine abortion at present employed present difficulties, which in the light of our present knowledge seem to be insurmountable, it would appear to be necessary to employ a combination of these various methods if the best results are to be obtained. It is only by the exhaustive discussion of these and of many other similar points which are presented in Professor Edwards' paper by men who are daily called upon to undertake the control of epizootic bovine abortion that real help can be afforded the laboratory workers, and any real progress can be made in controlling the disease.

Abstracts and Reviews.

Cataracta senilis of the Dog as an Index of Age.

With old age comes impaired nutrition of the crystalline lens, and resultant loss of normal transparency. The opacity commences as a circular dimming of the lens around the nuclear zone. Such a condition represents the state of *Cataracta senilis incipiens* which is invariably attained by all otherwise normal eyes before a dog has reached the age of ten years. It is preceded by alterations in the shape and density of the lens which do not lessen its transparency, but which give rise to a refraction anomaly, whereby the appearance of having a cataract is given to the lens when it is examined by ordinary illumination without the aid of the ophthalmoscope. This "Senile-reflex" (Altersreflex) may appear at as early an age as 5½, but generally it first becomes evident between 7 and 7½ years, and is well marked between 7½ and 8½. After that age it is replaced by true incipient senile cataract, when the presence of definite opacity of the lens is not only suggested by ordinary unaided examination, but is confirmed by the use of the ophthalmoscope. Exceptionally the change from "senile-reflex" to definite incipient senile cataract does not take place until the dog is 9½ years old, and equally rarely it occurs before the age of 7½. Often this condition of incipient cataract remains stationary during some years, but generally it gradually becomes transformed into one of true *Cataracta senilis* by the time the dog is 10½ to 11 years old. Even in very old dogs morbid alterations in the lens as the result of senility alone rarely proceed as far as the state of *Cataracta senilis matura* with its attendant total blindness.

During the earlier years of a dog's life an experienced man can obtain some idea of the animal's age by the appearance of the incisor teeth, although these dental alterations are very inconstant. More reliable is the opinion as to senility, which can be formed by observations of the stage of development of greyness of the head, which state commences about the age of 5 or 6 years, with the appearance of a few white hairs about the muzzle, and goes on until a dog of 13 or more years is distinctly grey-headed.

[Die Cataracta senilis des Hundes, ein Massstab der Alterschätzung. Gleichzeitig vergleichende Untersuchungen über den Wert der Alterbestimmung nach dem Gebiss und dem Grauwerden der Kopfhaare. By H. Jakob. Archiv fur wissenschaftliche und praktische Tierheilkunde. 1921. Vol. 47, Part I. Aug. 17th, pp. 6-14.]

H. E. H.

The Epidemic and Epizootic Significance of the Different Types of the Tubercle Bacillus.

The different types of the tubercle bacillus, it would almost seem, have been discussed often enough and at sufficient length, and, it might be added, with sufficient emphasis, to have exhausted the need to say anything more about them. But the questions that are still being asked imply that this is not true, and the matter that has remained clouded with uncertainty in many minds, though it is a factor of major importance in its bearing on the nature of our various antituberculosis activities, is the relation of the different types to epidemic and epizootic manifestations of tuberculosis.

An impartial study of the available evidence leaves little doubt that tubercle bacilli may be divided into at least three clearly distinct types—the human, the bovine and the avian, and no one acquainted with the numerous unsuccessful attempts that have been made to transform one type into another will be led far astray by superficially plausible transformation theories, or find encouragement in such theories for the belief that the distinctive characters of the different types lack permanence or stability.

By this I do not mean to say that the tubercle bacillus shows absolutely no variations under different conditions of growth and multiplication, as even the late Dr. Robert Koch, a positive and certainly the most authoritative advocate of the stability of the different types, frankly admitted

that determinable variations, alike in morphology and virulence, of a kind that lack value as evidence to prove that one type may be transformed into another, had been recorded.

The tubercle bacillus, without doubt, is gifted, like most organisms, with a fair degree of plasticity, which enables it to conform in some measure to the requirements of its environment, but this does not account for the difference between the several types. Neither can the difference be explained by the assumption that it is a question of pathogenic virulence correlated to some extent with no greater variation in morphology than we find in many true polymorphic organisms. This is well illustrated by the respective pathogenicity of the different types for two animals widely used in tuberculosis investigations. Guinea-pigs are highly susceptible to the human and the bovine types of the tubercle bacillus and strongly resistant against the avian type. Rabbits are strongly resistant against the human type, which readily attacks guinea-pigs, and are quite susceptible to the avian type, against which guinea-pigs are strongly resistant. If the difference were purely a question of a degree and not of a kind of pathogenicity, either guinea-pigs would not be more vulnerable to the human type than rabbits or rabbits would not be more vulnerable to the avian type than guinea-pigs. The more this difference in the kind, as distinct from a degree, of pathogenic virulence is studied with different species of animals, the stronger and more convincing the evidence on which it is based is found to be.

The theory that the tubercle bacillus is an actively mutating organism, of which the currently produced types best adapted to the environment in which it lives and multiplies gradually become dominant and crowd out other forms, was at one time very attractive to me, and it was my opinion that it would eventually be proved. It is in harmony with the widely entertained belief that most tuberculous disease among human subjects, irrespective of the age at which it asserts itself through symptoms, is caused by tubercle bacilli that entered the body during childhood, and the fact that the bovine type of the tubercle bacillus is found frequently in the tuberculous lesions of children and rarely in those of adults, and the discovery of exceptional or aberrant types of the tubercle bacillus, seemingly intermediate between the human and the bovine types. But it has remained wholly unsupported by eagerly sought, unimpeachable experimental evidence, and cannot now be accepted as tenable, particularly as the required evidence could easily have been procured and soon would have become very abundant if the transformation of the type of the tubercle bacillus through the influence of its environment were common enough to require consideration as a practically significant event.

In our thoughts on transformation we should bear in mind that we have no valid reasons tobelieve that the environment in which an organism lives and reproduces itself tends to induce or engender adaptive, heritable modifications that contribute to its welfare or insure its perpetuation. All we know about the functions of the environment in the development and establishment of new types, varieties and species is that it selects and preserves desirable and discards undesirable variations. The heritable variations or mutations, equally the selected and the discarded, result from undiscovered causes. Hence, unless the tubercle bacillus is an organism which, through the action of unknown causes, more or less continuously produces its various known types, each ready to be selected or specially favoured by the environment in which it happens to be located, transformation cannot serve as a reasonable explanation for the commoner occurrence of the different types in different species of animals or at different ages in the human species. And if the bacillus currently produced its different known types, an enormous number of successful transformation experiments would have been recorded, and the gradual change from one type into another would have been observed time and again.

It is fortunate, too, that the speedy transformation of the tubercle bacillus from type to type and its better adaptation to a number of different environments is not a common phenomenon, otherwise we would be confronted in our antituberculosis work not with three distinct types, each with a reasonably determinable or measureable significance, but with a protean pathogenic organism which, in addition to its common human, bovine and avian types, could hardly have failed to produce also porcine, bovine, canine, feline, equine and many other types each of which would be at once particularly pernicious for some one species of animals and would, moreover, harbour the evil potency for the rapid development of a high specialised perniciousness for any and all other species, and the separate eradication of human, bovine and avian tuberculosis would be a hopeless dream and its attempt a futile waste of time and energy.

A better argument against the transformation theory can hardly be found than two well-known facts, namely, that no species of warm-blooded animals is wholly immune against all types of the tubercle bacillus, and that no satisfactory proof has been obtained to show that the number of types has increased through their growth and multiplication in a large number of different species of animals. I say this though I am acquainted with the rare isolation of alleged unusual types from species of animals, like reptiles and fish, that are ordinarily regarded as immune against tubercle bacilli. Even the epizootic frequency of tuberculosis among hogs has not resulted in the transformation of the tubercle bacillus of the bovine type into a true porcine type.

Now, having a group of closely related but truly distinct organisms which act as the prime etiological factors of a disease that attacks many widely different species of animals, what is the significance of each of the several organisms with regard to the epidemic and epizootic occurrence of the disease? The answer to this inquiry, I believe, can readily be found through an analysis of the reasons we have for speaking of the several organisms as human, bovine and avian types.

We have a good reason for speaking of the human and bovine types as "mammalian," as they rarely attack other animals than mammals; and the reason for the name "avian" is equally good, as this type rarely attacks other animals than birds. Of the more specific designation, the "human type," we may say that this similarly is reasonable, because this type is more commonly found in human subjects than any other type and is of rare occurrence in the lower animals. But when we come to the "bovine type," in view of statistics like those supplied by our meat-inspection service, which indicate that it attacks hogs as often as cattle, if not oftener, we must hunt for a different and better reason to justify its name than the frequency with which it occurs in one or another species of animal. And we do not have to hunt long to find an excellent and convincing reason.

The tubercle bacillus is a parasite; the victim of tuberculosis is its host; it is not only a parasite but an obligatory parasite, which, separated from its host, neither grows nor multiplies. After the parasite is expelled by one host it must soon enter another, else it is doomed; and unless it is expelled by its host before the latter dies it is also doomed. Further, it is a delicate, nonsporulating bacterium. easily killed by exposure to light; it has no independent power of locomotion; it can not be transported by currents of air more than a few yards without losing its virulence or ability to multiply in its hosts; and tuberculous disease, or the result of the true junction between the parasite and its host, usually requires long continued, frequently repeated, or intense exposure of the host to the parasite. From these statements it will be apparent that the parasite, to insure it against extermination, must be related to its hosts in a way that provides for its ample multiplication and its free, abundant and long continued dissemination.

The relationship between the human type of the tubercle bacillus and human beings and between the bovine type and cattle is of a kind that makes these provisions. In both cases the lung, an organ in free communication with the exterior of the body, is a common habitat of the parasite; in both cases the tuberculous lesions in the lung break down and discharge their contents into the air passages; in both cases the tuberculous material, charged with the parasites, is coughed up and reaches the mouth; in one case it is largely expectorated, often in a careless, dangerous way, and in the other it is swallowed and the tubercle bacilli it contains pass through the digestive tract without loss of virulence and out of the body through the rectum; in both cases material infected with the parasites is sprayed from the mouth and nose during coughing and other forcible expiratory efforts; in both cases the disease is usually chronic, slowly progressive, long enduring in character, which insures that its victims may long remain agents for the dissemination and perpetuation of the parasites; and in both cases the dissemination often begins long before the danger is recognised or suspected. Plainly, human beings are ideal hosts for the human type and cattle for the bovine type of the tubercle bacillus. In both cases we have bodies in which the respective types multiply abundantly without causing marked or observable disturbances of health in the earlier stages of their parasitism, in locations and with the production of lesions which facilitate their expulsion and dissemination, and this expulsion and dissemination, as notably favourable for the perpetuation of the parasite as it is dangerous for its prospective hosts, may continue, with constantly increasing activity, not for days and weeks and possibly months, as is the case with the parasites of more acute self-limiting bacterial diseases, but for years.

When the bovine type of the tubercle bacillus inhabits the human body the conditions are quite different, and cattle are so highly immune against the human type that it requires no consideration whatever in bovine tuberculosis eradication projects. The bovine type truly multiplies in the human body, but remains so locked up in closed lesions in this otherwise favourable host that we may conclude with considerable assurance that tuberculosis among human beings, caused by the bovine type of the tubercle bacillus, contributes nothing to the perpetuation of this kind of tuberculosis or its parasite, and that practically every case of tuberculosis in human subjects due to bovine tubercle bacilli must be charged to intimate contact, in most instances through the ingestion of contaminated dairy products, between persons and tuberculous cattle.

The relative frequency with which the bovine type of the tubercle bacillus attacks hogs and cattle, taken by itself, would lead to the conclusion that either of both of two names, "porcine" and "bovine," would be proper for it; but the moment we realise that tuberculosis among hogs and tuberculosis among cattle have no true reciprocal relationship, in that tuberculosis among hogs is almost entirely dependent, like bovine tuberculosis among children, on their exposure to tuberculous cattle, and that tuberculosis among cattle is in no respect dependent upon the exposure of cattle to tuberculous hogs, we see that the bovine type of the bacillus is correctly named and that it would be an error to designate it as porcine.

The fact of the matter is, though tuberculosis among hogs has reached an epizootic character, the host and parasite relationship between the hog and the tubercle bacillus does not adequately insure the perpetuation of the parasite, and tuberculosis among hogs, like bovine tuberculosis among children, is therefore purely an adjunct or an appendage of the widespread prevalence of tuberculosis among cattle. In other words, tuberculosis among cattle is a great, self-sustaining, self-perpetuating plague, and bovine tuberculosis among children and tuberculosis among hogs are its attendant, accompanying, incidental or concomitant evils, which are not self-sustaining or self-perpetuating, and not even reciprocally related to the cattle plague which gives them their origin. Hence tuberculosis among hogs and bovine tuberculosis among children are plagues which can not be controlled by measures which deal with the victims of the disease, but which would rapidly subside if the exposure of children and hogs to tuberculous cattle were prevented or tuberculosis among cattle eradicated.

(To be continued.)

Clinical and Case Reports.

Problems in Diagnosis.

CASE I.—By W. R. DAVIS, M.R.C.V.S., Enfield.

Subject.—A valuable shorthorn cow, five years old.

History.—She gave her usual quantity of milk and cleared up her food on Saturday morning, and at 8 a.m. was turned out with the other cows. At 12-30 p.m. she was found dead in the field. I saw the carcass at five p.m., and found it to be very tympanitic, no subcutaneous emphysema. A small quantity of rather firm fæces lay below the anus. There was a good deal of white froth and a little blood at the nostrils.

The mucous membranes were congested. There were no signs of any struggling before death—she seemed to have dropped in her tracks. Anthrax was of course suspected, but the owner was very loath to report unless we ascertained that it was a case. I took some blood on a couple of slides and examined them after staining with methyl blue in the ordinary way. No trace of bacilli was found, and we 'phoned for the knacker to remove the carcass next morning.

Post-mortem.—I made a p.m. at the knacker's yard. Unfortunately the bowels were taken out before my arrival, and in their removal a large abscess connected with the anterior surface of the liver and the diaphragm had apparently been opened, and a great quantity of pus covered the liver and intestines. The spleen was normal, as was rumen, and packed with food. The lungs were deeply congested, and in the heart cavities and large vessels were large dark thrombi. It is possible that the abscess may have ruptured before death, but this would hardly explain the extreme suddenness of the cow's death.

It appeared to me that she had died from asphyxia.

CASE II.—By F. W. TAYLOR, M.R.C.V.S., New Ross.

The following is an account of a case in a mare which I consider very unusual, and I would be glad if any of your readers could throw any light thereon. It commenced on the 22nd September, and was 17 miles from my surgery.

Subject.—A six-year-old chestnut mare (van).

History.—Mare was working during the day and turned to grass at night up to Tuesday, 20th September, when she went to grass in the evening, apparently in normal health.

On the morning of the 22nd, at about 7 a.m., was seen by owner and nothing unusual noticed. At about noon was caught by her attendant in order to take her in to work. When he arrived in the field the mare was grazing. He secured her and led her towards the gate. After walking about twenty yards she seemed seized with a severe pain—went down immediately, and struggled for a few minutes, then she suddenly jumped to her feet and galloped some 200 yards across the field, stopped suddenly, went down as before, and struggled violently, remaining in this condition.

Symptoms.—I was called later in the day and reached the scene about 7 p.m. On arrival I found the mare in the field, where she had remained since noon without rising, but struggling continuously. She was sweating profusely, and was attacked with convulsive spasms at intervals of of about two minutes, each attack lasting about 10 to 15 seconds. During these attacks the head was drawn forcibly towards the chest, but no attempts were made at vomition.

During the spasms and the intervals between them she frequently struck her mouth forcibly against the ground, and so had the upper and lower lips much bruised and swollen.

Her temperature was 104° F.; pulse 72 per minute, but weak; respirations 20 per minute. Jaws clenched. Urine appeared normal and only a small quantity in the bladder. Fæces normal, and only small amount in the rectum.

Conjunctiva deeply injected, but eyelid also bruised from striking ground occasionally.

Treatment.—Gave ʒiiss. chloral, but with difficulty, owing to jaws being clenched. The chloral took effect within a few minutes, the mare lying quietly for about one-and-a-half hours, when she again began to get uneasy and to struggle. I then decided on giving gr.1 arecoline hydrobrom., which produced no effect except to cause a few contractions of the œsophagus. About half-an-hour after giving the arecoline the mare showed a marked improvement and made a good effort to rise, but collapsed, and from this time she remained in a state of semi-coma. As it was now night and mare was in an open field, I had her

removed on a float to an open shed, which I succeeded in doing without any trouble.

Her pulse had now become stronger and the jaws unclenched. I then gave her half a pint of whisky, which she took easily, and having rugged and made her as comfortable as possible, I left; instructing the owner to wire me how she was in the morning.

Received wire from owner saying mare had died in the morning.

Owing to distance from home it was impossible to make post-mortem.

In some respects this case resembled a bad attack of azoturia, but this was negatived by the condition of the urine, and also by the history of the attack.

Brain lesions were contra-indicated by the real pain, which appeared abdominal, and also by the eyes, which, in appearance and reaction, appeared perfectly normal.

The length of time the mare lived and the apparent improvement would not lead me to suspect poisoning, so I can best close my account, as I began, by saying case was undiagnosed, although, I may mention, I did not explain this to the owner.

Veterinary Surgeon Vindicated.

R.S.P.C.A. and a Pet Dog.

A well-known Bolton veterinary surgeon, Mr. G. Mayall, St. George's Road, was charged on September 16th, at the Borough Police Court, with unlawfully and cruelly causing unnecessary suffering to a dog by wantonly failing to give it proper care and attention. The prosecution was brought by the R.S.P.C.A., for whom Mr. A. Lawson appeared, and on behalf of defendant, Mr. A. F. Greenhalgh strongly contested the allegation. The animal was a crossbred Pom and bulldog, the property of Miss Ramsden, 159 Park Road. Her story, given in evidence, was that on July 28th, as she and her mother were going on holiday, the dog was lodged with defendant, and witness called for it again on August 11th. A boy took the dog from a small enclosure, and when she got it into the road it was very restless. It kept wanting to stop and scratch and roll; she dare not take it on the car, and had practically to drag it all the way home. In her opinion it was suffering. Moving its coat at home witness found lice. That night she told Mr. Mayall of the dog's condition, and he sold her some lotion which he thought would remedy the trouble. In consequence of its pain and suffering, however, she had to have the animal destroyed the folllowing morning.

Mrs. Ramsden confirmed her daughter's statement that the dog was in perfect condition when taken to defendant's, and Mrs. Swift, who lives with the Ramsdens, corroborated the statement that the animal was "alive" on its return.

Mr. E. G. Swift, chemist, spoke to the dog being all right before it was taken away, and when he examined it on the 12th inst. it was alive with lice, whimpering, jumping about, and no doubt suffering. It was pitiable to see it in that state, and at Miss Ramsden's request he poisoned it. Witness agreed that the vermin were something like a highly-magnified illustration handed to him by Mr. Lawson.—Mr. Greenhalgh: They're not quite the size, you know. (Laughter.)

Inspector W. H. Paddison, R.S.P.C.A., said he exhumed the dog, and the vermin he found on it must, in his opinion, have caused the animal pain. At defendant's place he saw a dog kennel six feet long and two feet wide, which was a very small place for a dog. In a conversation he had with Mr. Mayall, the latter said, "Why didn't she send me a lawyer's letter instead of reporting it. I am responsible. The dog was all right when it came here."—Cross-examined, witness said the kennel was sufficiently large if the dog were properly exercised.

Mr. Mayall, who had pleaded not guilty, gave evidence that he had been in practice as a veterinary surgeon 30 years. The dog was exceedingly vicious, would not let a stranger go near it, and did not take its food well until the second day. He had 12 or 14 dogs in at the time, and all the kennels were disinfected once a week. Lice would not live in the kennel unless there was a warm-blooded animal there. If a louse were under an animal's skin it could germinate in from 12 days to three weeks.—In cross-examination, defendant said the dimensions of the kennel were: 7ft. high, 6ft. 8in. long, and 2ft. 8in. wide. As was his custom, he saw the dogs properly cleaned and fed every morning. Miss Ramsden told him the dog had fleas on it, not lice, and did not say it was in great pain. The dog came for board and lodging; he was not paid for looking if every dog had fleas or lice on it when it came in. It was possible lice may have germinated on the dog on his premises, but if they did he was not responsible. It was no use examining a dog that had been buried seven days.

Mr. J. Adamson, veterinary surgeon, stated that he had examined the kennel at defendant's place. It had been recently whitewashed, and there was plenty of light and air for a small dog. If the animal had lice on it to the extent the Court was led to believe, lice must have been on it before it went to defendant's.—By the Magistrates' Clerk (Mr. J. H. Hall): If the dog were clean when it went there, it could not be in the condition described.

Dr. Bridge gave evidence as to the cleanliness of the kennels, and Mr. G. L. Rosser to having lodged his own dog there with satisfaction. The Magistrates at this stage dismissed the case, and Mr. Greenhalgh applied for ten guineas costs against the Society. After retirement the Bench allowed £6 0s. 6d. and £2 2s. advocate's fee.—*Bolton Journal and Guardian.*

Association Reports.

Eastern Counties V.M.A.

NOTES ON A FEW CASES SEEN IN COUNTRY PRACTICE—(*continued*).

Continuing his Paper, Mr. H. L. ROBERTS, of Ipswich, completing his account of Case V.—*Amputation of prolapsed rectum in a recently foaled mare*—said :—

The procedure recommended by Moller (Veterinary Surgery, by Moller, translation by Dollar, 1895 edition, page 304) for amputation of the rectum in dogs was followed. The mare remained in the standing position and only strained once during the operation, after which she drank some chilled water and ate a small bran mash.

She was then placed on a diet of gruel and given nux vomica in bolus form.

On May 8th the mare had an alarming attack of colic, which soon yielded to treatment. On May 11th she had another attack of pain, which soon disappeared. During the whole of the period from the time of the operation (5th May) she had frequent passage of flatus, accompanied by occasional severe straining, but no dung had been passed, therefore small doses ($\frac{1}{4}$ pint) of linseed oil were given for three days.

On 15th May, her pulse was 65, weak in character, but not thready, temperature 101°F. On this day the mare's general appearance was not bad. The gruel, in which was suspended a preparation of nux vomica, was continued.

On 19th May the owner wrote me as follows :—"My mare had passage through this morning at 12 o'clock after fifteen days' trial."

On the 22nd May the mare's pulse and temperature were normal, and her appetite good ; the gruel was discontinued, nux vomica being given in her food once daily.

On 1st June the mare was running out at grass during the day time and in the yard at night.

On 11th June the mare had another slight attack of colic, which passed off in a few hours ; on this date the mare was seen by several members of the committee of this Association, and it was noticed the stitches had not been removed.

On 18th June, *i.e.*, six weeks after the date of the operation, the mare was noticed to be dull, and off her food. During the afternoon of the same day violent pains ensued, and she died about 5 p.m.

In spite of the distance (18 miles) from home, I visited the same evening and made a post-mortem examination.

The carcase was distended. On opening the abdomen there exuded a quantity of fluid in which was suspended solid particles of ingesta. On removing the bowels one was struck with their apparent healthy appearance. The stomach was almost empty, and was found to be ruptured along the great curvature. On removing the organ, the internal surface of the cardiac portion was ulcerated and perforated ; adhering to the edges of the ruptured portion were a considerable number of live larvæ of the *gastrophilus equi* and larvæ of the *gastrophilus hæmorrhoidalis*. Close examination of the anus and the junction of the remaining portion of the rectum and sphincter ani revealed a condition which was indistinguishable from the normal.

In my humble opinion, if bots had not been present in such large numbers in the stomach, the mare would have been alive to-day and ready to have been put to work after harvest.

Case VI.—Sodii sal. in porcine subacute rheumatism.—In the May number of the *Veterinary Journal** this year, I noticed a translation of an account of the successful treatment of infectious articular rheumatism of the pig by the subcutaneous injection of salicylate of soda, by H. Stalder, veterinary surgeon, of Cossonay, Switzerland. The results of this method of treatment of acute rheumatism in young pigs claimed by the author prompted me to adopt the subcutaneous injection method in two adult animals.

A pedigree black boar and sow had been suffering from sub-acute rheumatism for about four months. The symptoms were decubitus, indifferent appetite, and if made to rise, both animals quickly assumed the recumbent position.

On close examination both hocks and knees were found to be enlarged, hot, and painful to the touch.

In the boar muscular rheumatism was also present in the lumbar region ; the left hock of the sow was the region most seriously involved.

On 24th June each animal was given a subcutaneous injection of salicylate of soda—two scruples in two ounces of boiled distilled water ; the site of injection was the flank.

On 30th June each animal was feeding well, and did not hide up in the straw as much as formerly. On 4th July the boar was walking well and fended about the adjacent meadow in apparent good health.

On this date the sow, although considerably better, was still very lame of the left hock; the swinging of the affected limb had disappeared, and she walked on her toes. On this day (July 4th) I gave each animal another subcutaneous injection of salicylate of sodii, three scruples to an ounce of boiled distilled water.

On 18th July, *i.e.*, twenty-four days after the date of the first injection, I considered the boar cured and the sow was progressing favourably.

The administration of salicylate of soda per ovem for rheumatism in animals has been usual for a very long time ; nevertheless, I am satisfied the extended application of the subcutaneous injection method of administration of this drug in all forms of rheumatism in animals is worthy of the serious consideration of the members of this Association.

This, gentlemen, concludes my notes, and I have to thank you for your kind attention, and trust there is plenty of scope for discussion.

* *Veterinary Journal*, vol. 77, No. 5, page 182.

Mr. HUDSON thanked Mr. Roberts for his most interesting paper, and congratulated him on his successes. He thought it was extremely hard lines that after such a success as he had in case five, which the members of the committee had seen at Stowmarket on 11th June, 1921, when the animal had recovered, it should have since died, more especially as the cause of death had no connection with the operation. He expressed his disappointment in that Professor E. Brayley Reynolds was unable to be present at this meeting to give them the help it was anticipated he would have been able to do. Mr. Roberts had, however, been very kind in stepping into the breach so admirably.

Mr. SHIPLEY joined with Mr. Hudson in thanking Mr. Roberts. He also was in sympathy with Mr. Roberts in the loss of case five after such successful treatment, but he thought that perhaps as the " bots " were in such numbers as to eventually produce a ruptured stomach, that they were capable earlier of producing intestinal irritation, causing enormous straining, and so accounting for the prolapsed rectum. He thought that, although it would be almost impossible to diagnose the condition produced by " bots," that it opened up the question that, provided one were able to diagnose intestinal derangement produced by " bots," what would be a satisfactory treatment?

In relation to Mr. Roberts' case (six) with reference to painful swelling of the joints in pigs, Mr. Shipley was of opinion that this condition was generally due to the presence of swine erysipelas, or at any rate some septicæmia, and consequently he agreed with Mr. Roberts that the salicylate of soda was an excellent treatment. He had for some time had experience of acid acetyl, salicyl, given in the form of an electuary, which had generally proved very satisfactory, but the hypodermic injection of the sodii sal. was a more convenient and direct method.

Mr. WELCH said that in intestinal disturbances produced by " bots " calcium carbide given in a gelatine capsule as a bolus would have the effect of eliminating the " bots."

Mr. NIXON thought Mr. Roberts' treatment of pigs with painful swelling of the joints by sodii sal. was very good, but personally he found medical treatment usually was not necessary, as this condition usually occurred in pigs which were kept on low-lying ground, and by the simple procedure of moving them to a higher level the animals recovered.

Captain P. R. TURNER thanked Mr. Roberts for his interesting paper. With relation to the treatment by Mr. Roberts of pigs, in Suffolk and in many parts of the Eastern Counties, with the exception of wealthy pig-owners, it was not practicable to visit all the various small pig owners who had crampy pigs for the purpose of inoculating them. He could not see how the small man could afford to pay for such treatment, and considered that sodii sal. given by the mouth would be just as satisfactory, without incurring such a heavy expense to the owner. He admitted that where practicable hypodermic injection was most satisfactory.

At the conclusion of this discussion, Mr. Roberts replied to the various remarks, expressing his regrets at not having learnt much from the discussion as to the course he should have taken in the various cases referred to.

The PRESIDENT then called for mention of any case of special interest that members cared to bring forward to the meeting. Amongst those presenting cases were Messrs. T. G. Heatley, P. R. Turner, W. Shipley, W. Waters, and E. A. Hudson.

OTHER CASES OF INTEREST.

Mr. HUDSON produced a piece of briar which he had extracted from the œsophageal opening of the pharynx of a horse. He was called in one evening to see a horse apparently choked, and found the animal capable of swallowing, but not relieved of its distressed symptoms. He inserted the gag, and passed his hand up the horse's mouth as far as he could reach, and could just touch a small object which appeared to be quite firmly attached, but he could not extract it. As it was late in the evening, he returned the following morning, cast and chloroformed the horse, and operated through the larnyx, as in the operation for roaring. He was then able to get hold of the foreign body which was stuck in the commencement of the œsophagus just above the epiglottis, and to remove this (briar produced), which had become attached to the lining of the œsophagus by the spikes on the stem. The wound in the skin over the larnyx was sutured and dressed with antiseptic dressings, and healed up perfectly normally. Mr. Hudson produced the animal for inspection by the members present at this meeting, and it was found difficult to discern the seat of operation, owing to the complete healing.

Mr. HEATLEY mentioned that he had had a similar case in which the causal agent was a piece of fork-shaped wood, as in a catapult. The " Y " shaped piece was too wide for passage down the œsophagus. The animal was trying to cough the obstruction back, when one branch of the fork passed above the soft palate, and the other branch of the " Y " passed into the fauces, and there stuck.

Mr. WELCH produced an interesting specimen of intestinal calculus.

Mr. TURNER produced a most interesting case of gall-stone in a horse. He was first of all called to the animal showing extreme abdominal pain. He treated it by narcotics and cathartics as in an ordinary case of colic, and after a time succeeded in getting comparative relief, but the animal failed to progress. The visible mucous membranes were markedly icteric, and, as the animal continued to get worse in spite of the treatment, he advised the owner to have the animal slaughtered. On post-mortem he found the gall-stone (produced),

about the size of a pigeon's egg, firmly wedged in the bileduct.

Mr. WILKINSON, of Martham, wrote regretting his inability to attend the meeting, and pointed out a peculiar case he had had in a bullock. He was called in one night to attend a fat bullock choked. On arrival he passed the probang without difficulty, but the distress was not relieved. As the owner was a butcher he advised him that, should the animal not get better by the following morning, he had better slaughter it for food, which he did. About a month afterwards a fat bullock in the next box was sold at the local market, and proceeded by train to London, where the following morning he was found dead in the butchers' pound. The Ministry of Agriculture investigated the case, but nothing of any importance was discovered.

Mr. Wilkinson asked the members of the meeting if they thought it probable that the bullock he had under the treatment was suffering from anthrax. If it was, how did he stand legally, having ordered the animal to be slaughtered, although he had had no suspicion of anthrax? No member offered any comments.

The meeting was closed by a hearty vote of thanks to the President for his conduct in the chair.

W. SHIPLEY, *Hon. Sec.*

Obituary.

MAJOR C. W. B. SIKES, O.B.E.

As announced elsewhere, the death has occurred of Major C. W. B. Sikes, O.B.E., M.R.C.V.S. Qualifying in 1898 from the London Veterinary College, the deceased was assistant with the late Mr. C. Hartley, of Lincoln, for ten years, and for some years with Mr. Barling, Newnham-on-Severn, and with Mr. W. Sewell, of London. Before the war, and until six weeks before his death, he was in practice at Warwick and Leamington. He joined the R.A.V.C. in 1915, and was soon promoted to the rank of Captain, being mentioned in despatches by Sir Douglas Haig, April 9th, 1917; April 18th, 1918; November 8th, 1918; March 16th, 1919. On being promoted to Major in July, 1917, he was appointed to the Headquarter Staff, acting as Deputy Assistant Director of his (the 41st) Division. He served in France, Italy, and on the Rhine. His quiet and gentlemanly nature endeared him to many friends.

Mr. D. M. GARDNER, HELENSBURGH.

"We very deeply regret to record," says the *Helensburgh and Gairloch Times*, "the death of Mr. D. M. Gardner, the well-known veterinary surgeon and grain merchant, which regretted event took place at his residence, Springvale, Helensburgh, on the 30th August. The deceased gentleman, who was in his 73rd year, was a native of Alexandria, and came to Helensburgh fifty years ago, when he started practice as a veterinary surgeon. In addition to his veterinary work he entered into partnership with Mr. Matthew Lindsay, Highfields, in a grain merchant's business. Later he started in the same line on his own account, and in course of the years formed one of the most extensive grain connections on the West of Scotland. He was one of the best known figures in Dumbarshire. For a number of years he was chairman of the Second Ward Committee. He contested a seat on the Town Council unsuccessfully, but that did not deter him from taking a keen interest in all public affairs. While in health he was a regular attender of the West Parish Church, in which he had at one time been a manager. Two books he knew well—the Bible and Burns. Well read, and of fine intelligence, he had a great fund of humour and a rich store of good stories. He may be summed up in a few words—a very fine Scotsman, of many sterling qualities. During the past five years he had been an invalid, suffering great pain, which he bore with great fortitude and courage. He is survived by a widow, one daughter, and seven sons, six of whom served in the great war. With them in their bereavement much sympathy is felt and expressed. The funeral took place at Helensburgh Cemetery on Saturday, and was largely attended by all classes from the town and the county generally."

Mr. Walter Gardner, M.R.C.V.S., a son, has an extensive practice in the Maybole district of Ayrshire.

Mr. REES LLOYD, PENYGRAIG.

The death took place quite unexpectedly on Saturday, September 17th, of Mr. Rees Lloyd, of The Pharmacy, Penygraig. Mr. Lloyd, who was 71 years of age, was the oldest chemist in the Rhondda, and also carried on an extensive practice as veterinary surgeon. He is the last of the four generations to carry on the duties of veterinary surgeon. His father was the late Mr. Harry Lloyd, of the Dowlais Steel, Iron, and Coal Company, Dowlais. Deceased was a great research worker, and in conjunction with Dr. Cobbold, F.R.S., the lecturer of Middlesex Hospital, he investigated and reported to the congress the activities of "Strongylus and Tetracanthus." He was appointed inspector under the Glamorgan County Authorities for foot-and-mouth disease and represented Penygraig upon the county council from 1901-7. He leaves a widow and four grown-up children. His brothers are well known, one being Mr. Henry Lloyd, ex-mayor of Merthyr, the other, Mr. John Lloyd, general manager of Morgan's Engineering Works, Aliance, Ohio, U.S.A.

Mr. A. B. WREN, BURY.

The death of Mr. Augustus Burney Wren, veterinary surgeon, 63 Walmersley Road, Bury, took place on September 17th rather suddenly. He was a native of Manchester, and served his articles with a well-known city veterinary surgeon. He had been in practice in Bury for over thirty years. At one time his establishment was in Bolton Street, but subsequently he transferred the business to Walmersley Road. He had appeared in many cases, as veterinary surgeon witness, before local courts. He was a Freemason, and was very widely known in Bury and surrounding districts, into which his professional engagements took him, and personally he was held in high regard. He was in his 72nd year.—*Bury Guardian.*

EVANS.—At Llanrwst, Denbigh, on September 25th, David Evans, M.R.C.V.S. Graduated London, 1908.

SIKES, MAJOR CHARLES WILLIAM BOOTH, O.B.E., M.R.C.V.S., died September 16th, 1921, of Castle Lane, Warwick, second son of Mrs. Sikes, Clevedale, Holly Road, Retford. Age 46.

Correspondence.

Letters to the Editors should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue

The Editor does not hold himself responsible for the opinions of his correspondents.

Value of Defence Society Membership.

Sir,—The enclosed report of a case brought against me by the R.S.P.C.A. representative in this town shows how veterinary surgeons stand to get shot at in the conducting of their business and profession, and incidentally it stresses the importance of belonging to our Defence Society. It appears as if an interfering sentimentalist with no scientific qualifications at all can at once set the law in

motion against any one of us and bring the most flimsy and ignorant evidence against us in support of his charge. The hauling of a veterinary surgeon up to a police court to answer a charge of negligence or malpractice is bad enough, but to drag him there on a charge of cruelty, the evidence of which only existed in the imagination of an ignorant layman, is much worse. It will be observed that no veterinary evidence was given on behalf of the R.S.P.C.A., and one wonders how their representative here ever got permission to prosecute. On putting my case before a representative committee of the Defence branch of "the National Veterinary Benevolent and Mutual Defence Society" at Manchester, it received very sympathetic and careful consideration, and the committee decided to give me all the support in their power and *carte blanche* to take all possible steps to defend myself. I hope one result of the case will be a considerable addition to the membership of the N.V.B. and M.D. Society, and I am sure the general secretary, Mr. G. H. Locke, M.R.C.V.S., Grosvenor Street, Oxford Street, Manchester, will welcome all applicants to the fold, and will be pleased to answer any enquiries from intending members.—Yours faithfully, GLADSTONE MAYALL, M.R.C.V.S.

88 St. George's Road, Bolton.

[A report of the case to which Mr. Mayall refers appears elsewhere.—ED.]

Post-Graduate Course Suspension.

Sir,—I sympathise with "Applicant." I think, however, he should apply to Sir Stewart Stockman, who, in his reservation which was added to the *Report of a Committee on Research in the Colonies*, said, "I venture to think that the existing facilities for post-graduate study in diseases of animals and kindred subjects are excellent." No doubt this gentleman will be able to tell you where you can get the facilities you require.—Yours faithfully,

"ENQUIRER."

September 18th, 1921.

Army Veterinary Service.

LONDON GAZETTE.—WAR OFFICE—REGULAR FORCES.

September 22nd.—The following relinquish their commissions on completion of service (September 1st):—Temporary Major W. Jowett, F.R.C.V.S., and retains the rank of Major; Temporary Captains, and are granted rank of Major:—A. E. Roberts, C. W. B. Sikes, O.B.E., H. G. Simpson. Temporary Captains and retain rank of Captain:—W. Andrew, A. E. Bailey, T. Bannatyne, J. R. Barker, J. Blackburn, W. E. Blackwell, F. G. Buxton, P. Carter, M. Cunningham, J. Forbes, J. B. Garside, F. C. Gillard, M.C., R. Hopps, S. T. Jackson, J. D. Knowles, F. H. Leech, L. Littler, C. J. S. Macara-Finnie, B. A. McGuire, O.B.E., W. R. McKinna, R. W. M. Mettam, T. Morland, C. Nicholson, M. G. O'Garty, T. M. Parker, C. W. Perrin, J. Pollard, J. R. Rigby, C. E. Rix, A. Rouse, A. D. Sanderson, J. Scott, A. J. Sellers, E. J. B. Sewell, J. Smith, W. A. Smith, D. Starkey, O.B.E., W. S. Stevens, G. S. Thomas, W. S. Walker, J. D. Whitehead, F.R.C.V.S.; Temp. Lt. R. H. Oddy, and retains rank of Lieut.

September 23rd.—Major-General Sir L. J. Blenkinsop, K.C.B., D.S.O., to be Colonel commandant (August 23rd) (substituted for the notification in the *Gazette* of September 13th).

Diseases of Animals Acts, 1894 to 1914. Summary of Returns.

Period.	Rabies. Cases Confirmed. Dogs.	Rabies. Cases Confirmed. Other Animals.	Anthrax. Outbreaks confirmed.	Anthrax. Animals attacked.	Foot-and-Mouth Disease. Outbreaks confirmed.	Foot-and-Mouth Disease. Animals slaughtered as diseased or exposed to infection.	Glanders (including Farcy).* Outbreaks reported by the Local Authorities.	Glanders (including Farcy).* Animals attacked.	Parasitic Mange. Outbreaks reported by the Local Authorities.	Parasitic Mange. Animals attacked.	Sheep Scab. Outbreaks reported by the Local Authorities.	Swine Fever. Outbreaks confirmed.	Swine Fever. Swine slaughtered as diseased or exposed to infection
GT. BRITAIN.	No.	No.	No.	No.	No.	No.	No.	No	No.	No.	No.	No.	No.
Week ended 17th Sept., 1921 ...	...	...	6	7	...	...	...	1	11	18	6	17	8
Corresponding Week in 1920	2	...	5	6	...	16	...	...	27	33	3	21	5
Corresponding Week in 1919	2	...	3	3	1	7	1	2	27	36	...	45	27
Corresponding Week in 1918	...	...	1	2	...	...	1	1	37	53	4	12	11
Total for 38 weeks, 1921 ...	22	1	377	488	43	2958	10	28	1803	2776	416	923	323
Corresponding period in 1920	15	...	310	376	73	9575	10	17	3107	5169	309	1478	585
Corresponding period in 1919	143	3	145	191	28	1595	20	49	4125	8284	224	1663	750
Corresponding period in 1918	1	...	186	216	...	...	25	67	3553	6701	259	1051	421

NOTE.—The figures for the current year are approximate only. *Excluding outbreaks in Army horses.

IRELAND. Week ended 17th September, 1921	...	...	...	...	...	...	...	...	Outbreaks ...	6	1	16
Corresponding Week in 1920 ...	...	...	...	...	...	...	...	...	1	8	1	...
Corresponding Week in 1919 ...	...	...	...	...	...	...	...	...	...	6	...	6
Corresponding Week in 1918 ...	...	...	...	...	...	...	...	...	3	5	...	9
Total for 38 weeks, 1921	1	1	7	77	...	...	69		202	83	455	
Corresponding period in 1920 ...	1	1	...	...	1	3	86		225	9	25	
Corresponding period in 1919 ...	...	...	...	...	1	1	126		183	29	84	
Corresponding period in 1918 ...	2	2	...	...	...	...	92		213	21	72	

NOTE.—The figures for the current year are approximate only.